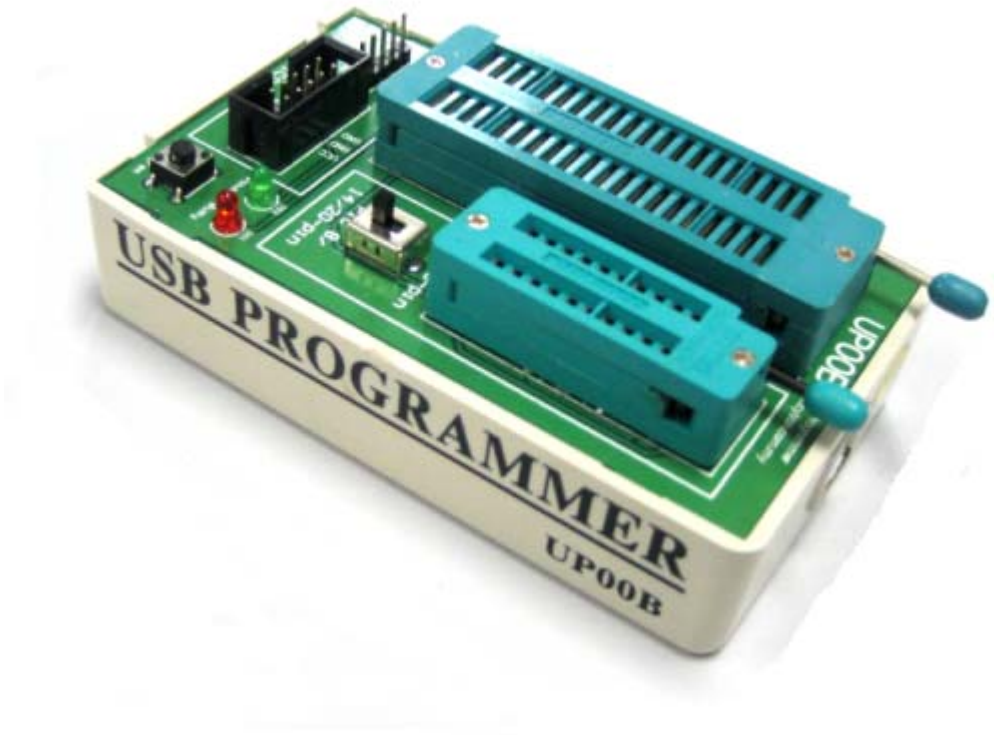
CYTRON USB PIC Programmer v2009

UP00B



V1.0

Nov 2008

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1. INTRODUCTION AND OVERVIEW

UP00B is the enhanced version of UP00A. As PIC MCU is gaining its popularity in market for student and hobbyist, more low cost and user friendly programmer is needed. Previous USB PIC Programmer, UP00A is obsolete because it cannot support Windows Vista, fail to program many new PIC MCU, further the firmware is not upgradeable. Hence, UP00B is now introduced to you! It comes with two ZIP sockets to offer program loading to 8 pin, 18 pin, 28 pin and 40 pin PIC MCU (8 bit) by using Microchip PICKit2 software. It offers a low cost yet convenience USB PIC Programmer to user. Loading program to PIC MCU will be as easy as 1, 2, 3. It has been designed with capabilities and features as below:

- USB powered, no extra power needed to load program
- Two ZIF sockets (20 pins and 40 pins) to ease program loading process
- Support most 8pin, 18pin, 28pin and 40pin PDIP 8 bit PIC MCU
- Support windows XP and Vista
- Support Intel and AMD based system
- Support Laptop and desktop PC

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2. PACKAGING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.

1. 1 x USB Programmer UP00B
2. 1 x USB cable (B type)
3. 1 x Software Installation and User's Manual CD
4. 1 x Programming cable (rainbow cable)

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3. SUPPORTED PICs

UP00B is compatible with Microchip PICkit 2 Programmer software. It has been tested to load program and below are the PIC models that has being tested using UP00B.

3.1 Supported PICs using ZIF Sockets

Baseline devices	Midrange devices	18F devices
*12F508	*16F506	18F1220
*12F509	16F610	18F1230
12F615	16HV610	18F1320
12HV615	16F616	18F1330
12F609	16HV616	18F2220
12HV609	16F627	18F2320
12F629	16F627A	18F2331
12F635	16F628A	18F2410
12F683	16F630	18F2420
	16F631	18F2423
	16F636	18F2431
	16F648A	18F2450
	16F676	18F2455
	16F677	18F2458
	16F684	18F248
	16F685	18F2480
	16F687	18F2510
	16F688	18F2515
	16F689	18F252
	16F690	18F2520
	16F716	18F2523
	16F72	18F2525
	16F73	18F2550
	16F737	18LF2550
	16F74	18F2553
	16F747	18F258
	16F76	18F2580
	16F767	18F2585
	16F77	18F2610
	16F777	18F2620
	16HV785	18F2680
	16F785	18F2682
	16F818	18F4220
	16F877	18F4221
	16F870	18F4320
	16F871	18F4321
	16F872	18F4331
	16F874A	18F4410
	16F88	18F442
	16F882	18F4420
	16F883	18F4423

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Baseline devices	Mid range devices	18F devices
	16F886	18F4431
	16F887	18F4450
	16F913	18F4455
	16F914	18F448
	16F917	18F4480
		18F4458
		18F4510
		18F4515
		18F452
		18F4523
		18F4525
		18LF4539
		18F4580
		18F4585
		18F4610
		18F4620
		18F4680
		18F4682
		18F4685

***** - These devices cannot support automatic detection in PICkit 2 Programmer. Hence, user needs to select the device's family by clicking *Device Family*, choose the correct device from the *Device* list in configuration column. This may applicable to other PICs which are not listed here.

3.2 Supported PICs using ICSP

All PICs stated above are also programmable using ICSP. Below are some dsPICs that only can be program using ICSP.

dsPIC devices
dsPIC30F1010
dsPIC30F2010
dsPIC30F2011
dsPIC30F2012
dsPIC30F2020
dsPIC30F3010
dsPIC30F3011
dsPIC30F3012
dsPIC30F3013
dsPIC30F3014
dsPIC30F4011
dsPIC30F4012
dsPIC30F4013

Note: For those PIC models not listed in the table (but supported in PICkit 2 Device Support List) are **not fully tested** by Cytron Technologies with UP00B. User is advised to ensure its compatibility at own risk.

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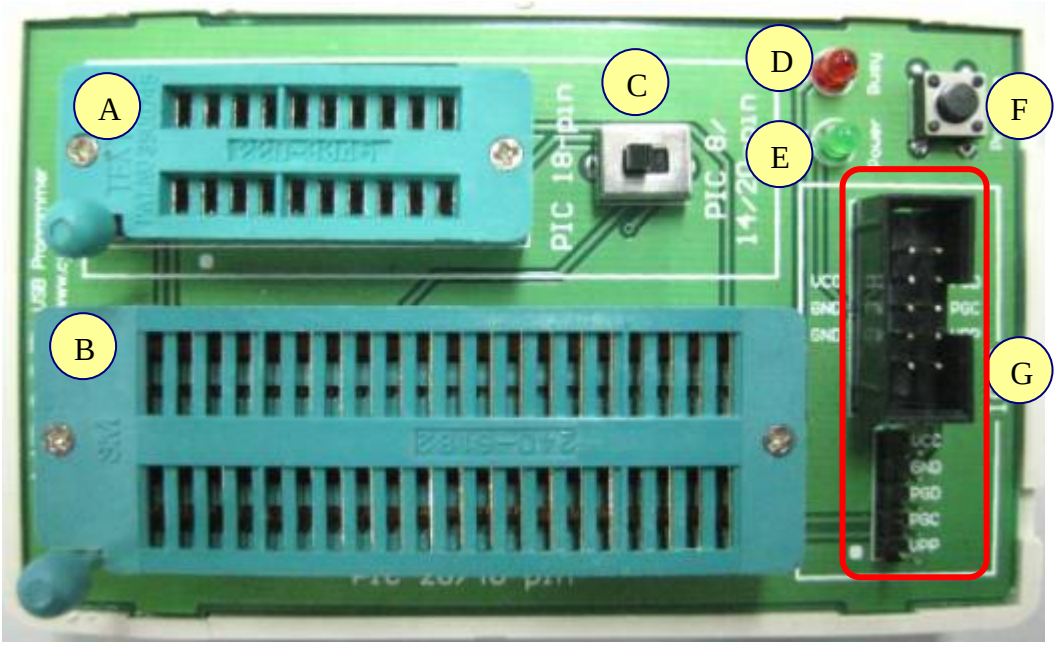
4. BOARD LAYOUT



Label	Function
A	ZIF Socket 20 pins
B	ZIF Socket 40 pins
C	Switch selector for PIC pins of ZIF Socket 20 pins
D	Busy LED
E	Power LED
F	Program Button
G	Connector for ICSP

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A – **ZIF Socket 20-pin** is used to place **8, 14, 18 and 20 pins PIC** during load program.

B – **ZIF Socket 40-pin is** used to place **28 and 40 pins PIC** during load program.

C – **Selector for ZIF Socket 20-pin**. If users want to program 18-pin PIC, push this selector to up position. If users needed to program 8, 14 and 20-pin PIC, push this selector to down position.

D – Busy LED. This LED is red in color. It will turn on when there is process going on in UP00B. For example, once PIC is placed in ZIF Socket, and PICkit2 programmer detected it, Busy LED will turn ON for a while. Same goes while PICkit2 Programmer Read, Write, Verify, Erase and Blank Check the program in PIC.

E – Power LED. This LED is green in color. It will turn ON once power is inserted to UP00B. When UP00B is connected to PC via USB B Type, this LED should turn ON.

F – Program Button. Press this button if user wants to program the PIC. It can only work after everything is connected and HEX Code imported. This button has the same function with clicking the 'Write' button in PICkit2 Programmer software.

G – Connectors for ICSP. These connectors are used to connect UP00B with board or any microcontroller for cases where user cannot place the PIC to ZIF Socket (eg: PIC is soldered directly to the board). UP00B provide two types of connector. User may choose either to use 5 ways pin header connector or 2x5 H type box header connector.

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5. INSTALLATION (SOFTWARE)

The programmer software for UP00B is Microchip PICkit 2 Programmer software. With the help of pictures and some simple instructions, the following section will guide user to install this software.

5.1 Install from CD

1. Place UP00B CD in to computer or laptop CD drive.
2. Browse to folder "UP00B setup".
3. Double click "setup" to run the installation wizard.

5.2 Download setup file from Cytron's website

1. User may download the setup file from Cytron's website:

   http://www.cytron.com.my/suppMaterial/UP00B_setup.zip

2. After finish downloading, unzip the file and click any from the two icons to launch the setup.

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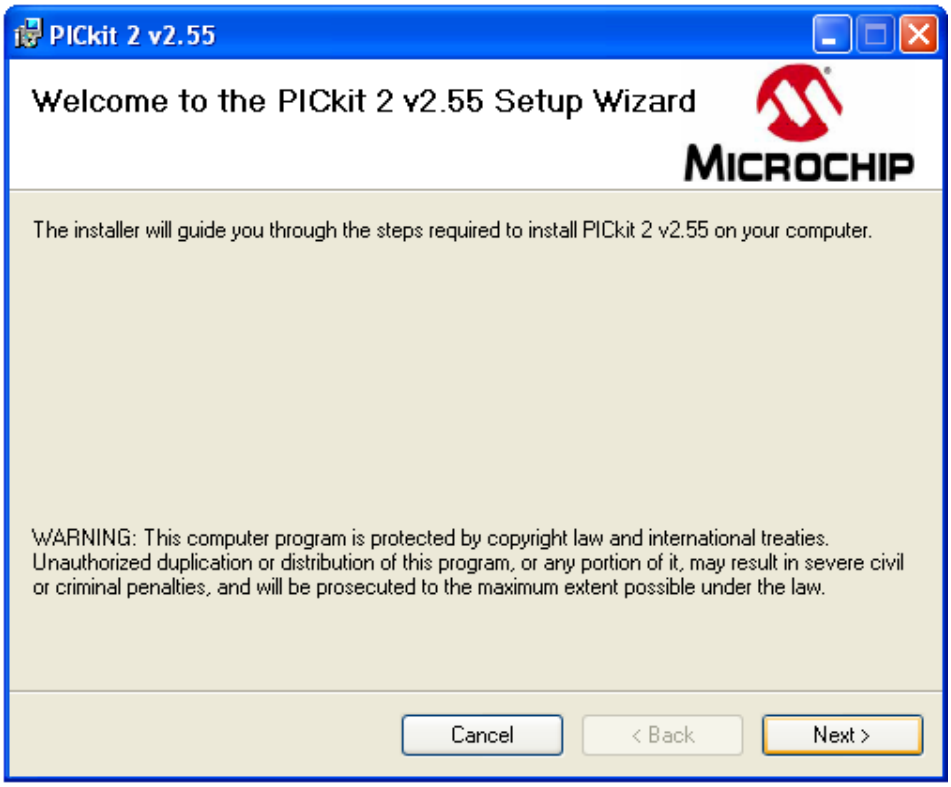
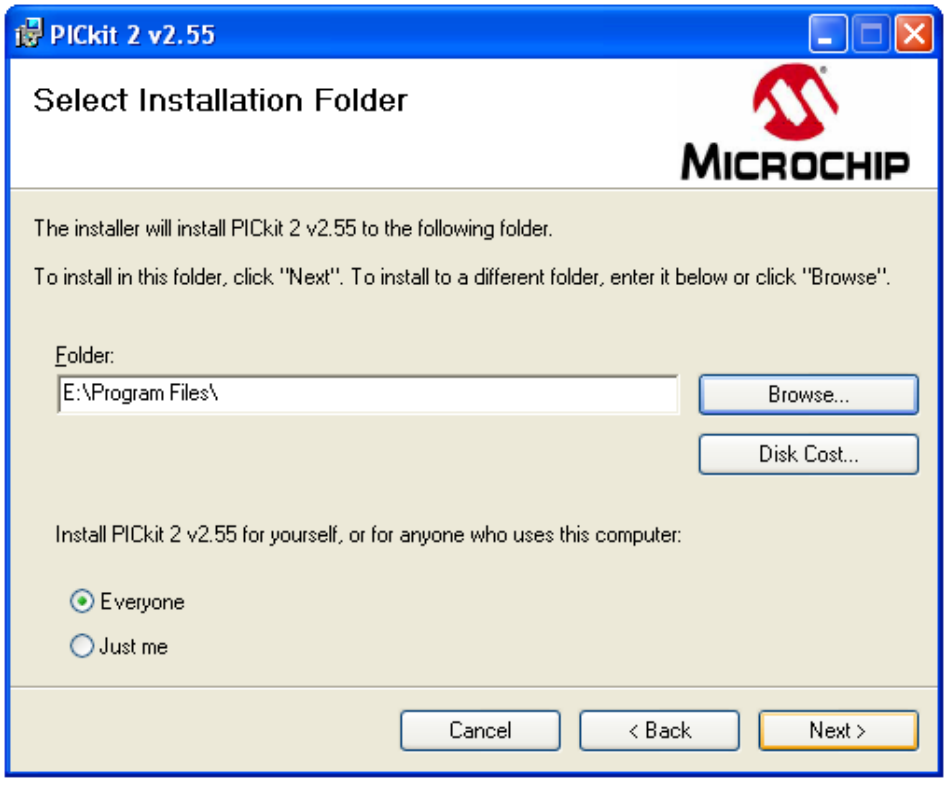
5.3 PICkit 2 Programmer setup procedures

Follow steps below to setup Microchip PICkit2 Programmer after launched the setup file.

1. Click next.


PICkit 2 v2.55
Welcome to the PICkit 2 v2.55 Setup Wizard
MICROCHIP
The installer will guide you through the steps required to install PICkit 2 v2.55 on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

2. Select installation folder and then click next.


PICkit 2 v2.55
Select Installation Folder
MICROCHIP
The installer will install PICkit 2 v2.55 to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
E:\Program Files\
Browse...
Disk Cost...
Install PICkit 2 v2.55 for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

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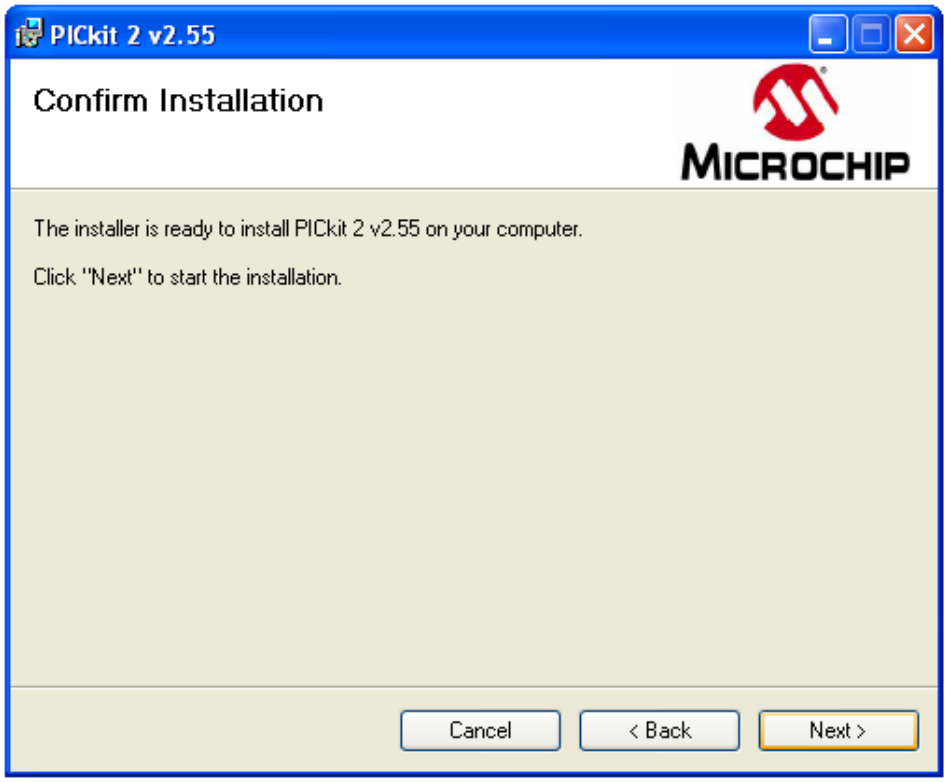
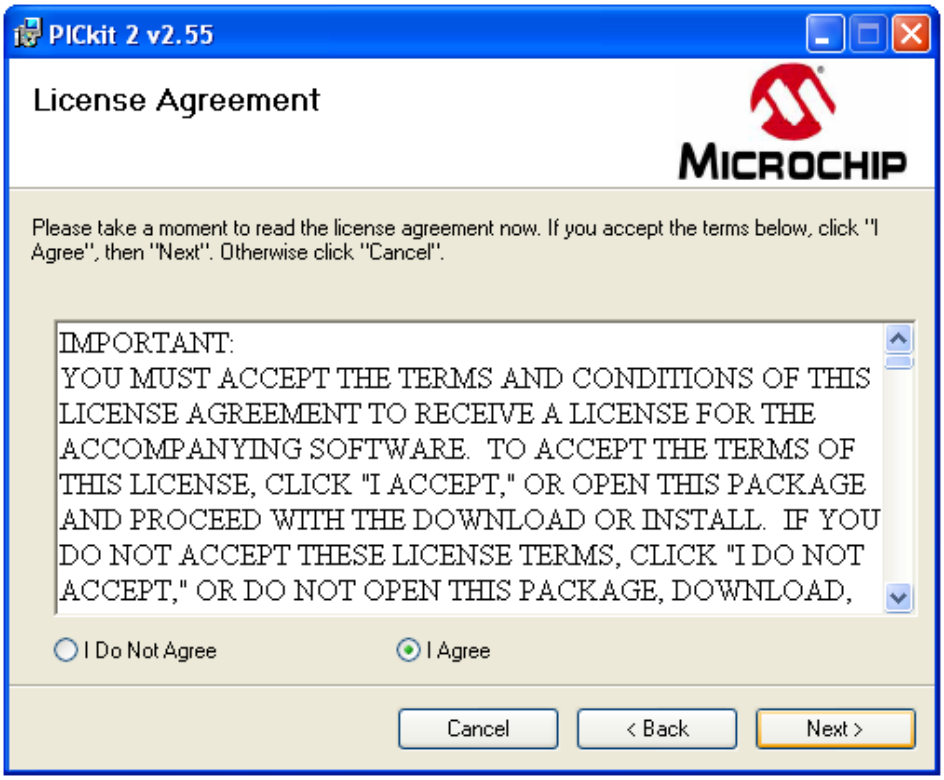
3. Click next to confirm installation.


PICkit 2 v2.55
Confirm Installation
MICROCHIP
The installer is ready to install PICkit 2 v2.55 on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

4. Take a moment to read the license agreement, click I agree and then click next.


PICkit 2 v2.55
License Agreement
MICROCHIP
Please take a moment to read the license agreement now. If you accept the terms below, click "I Agree", then "Next". Otherwise click "Cancel".
IMPORTANT:
YOU MUST ACCEPT THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT TO RECEIVE A LICENSE FOR THE ACCOMPANYING SOFTWARE. TO ACCEPT THE TERMS OF THIS LICENSE, CLICK "I ACCEPT," OR OPEN THIS PACKAGE AND PROCEED WITH THE DOWNLOAD OR INSTALL. IF YOU DO NOT ACCEPT THESE LICENSE TERMS, CLICK "I DO NOT ACCEPT," OR DO NOT OPEN THIS PACKAGE, DOWNLOAD,
I Do Not Agree
I Agree
Cancel
< Back
Next >

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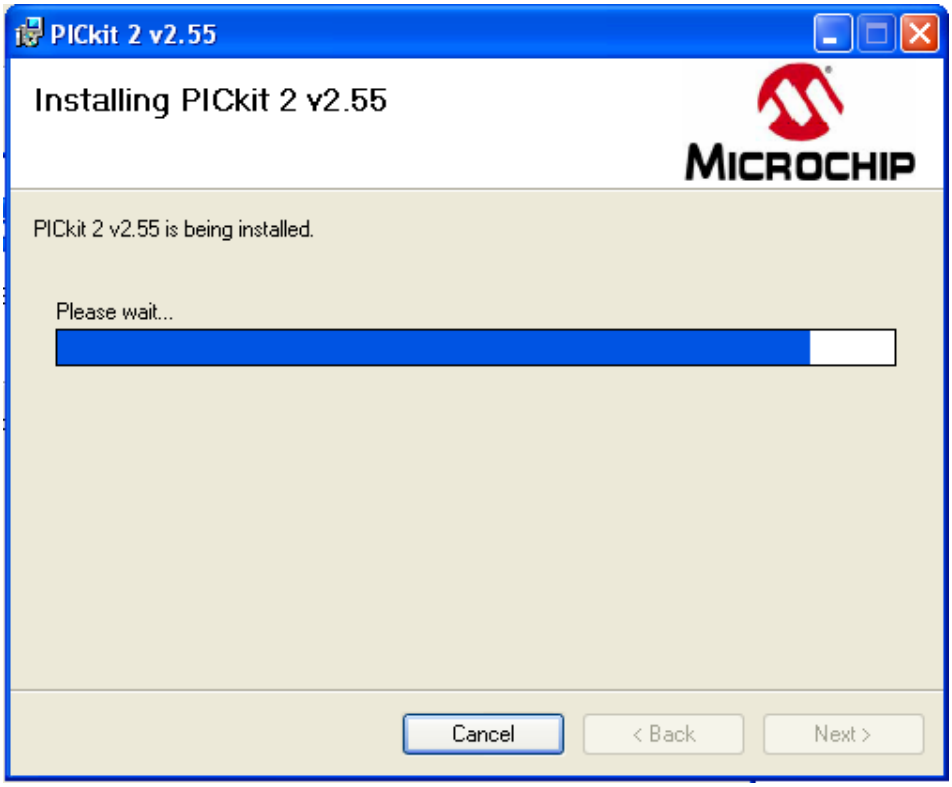
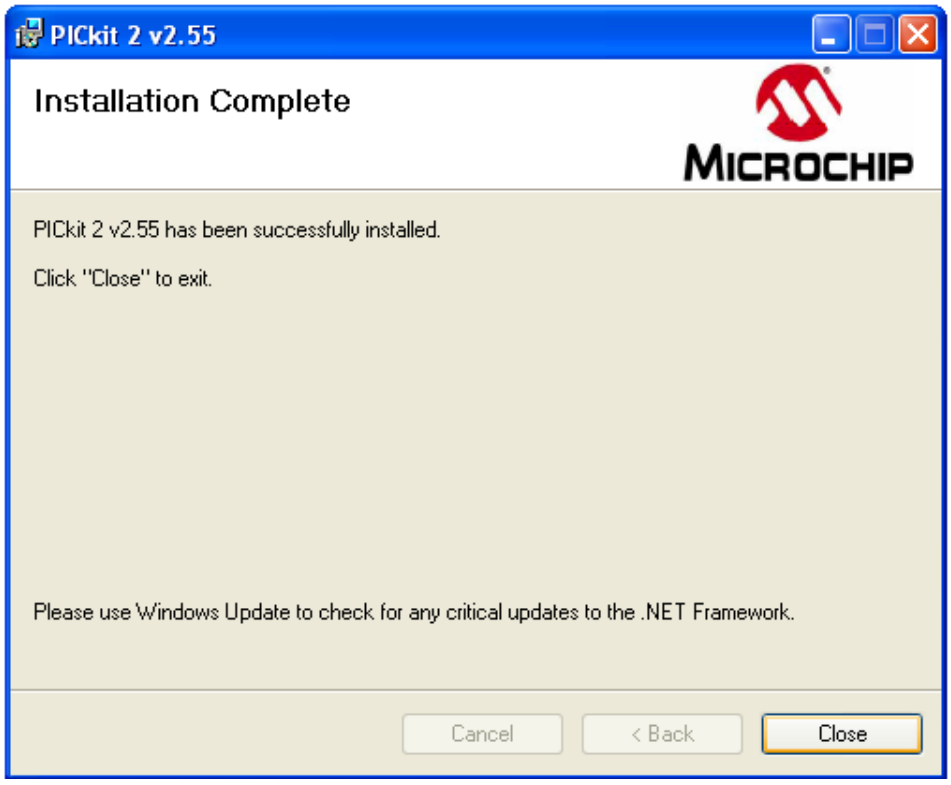
5. Wait for a while. PICkit 2 is being installed to PC.



6. After complete installation, click Close to exit.



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7. Shortcut to PICkit 2 Programmer is automatically placed on user desktop. Restart the PC if necessary to complete installation. Now PICkit 2 Programmer is ready to be used.

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6. INSTALLATION (HARDWARE)

6.1 Connecting UP00B with USB Type B cable

This is the main method to connect UP00B to computer. Use the USB Type B cable provided to connect the programmer to the USB port of the computer.

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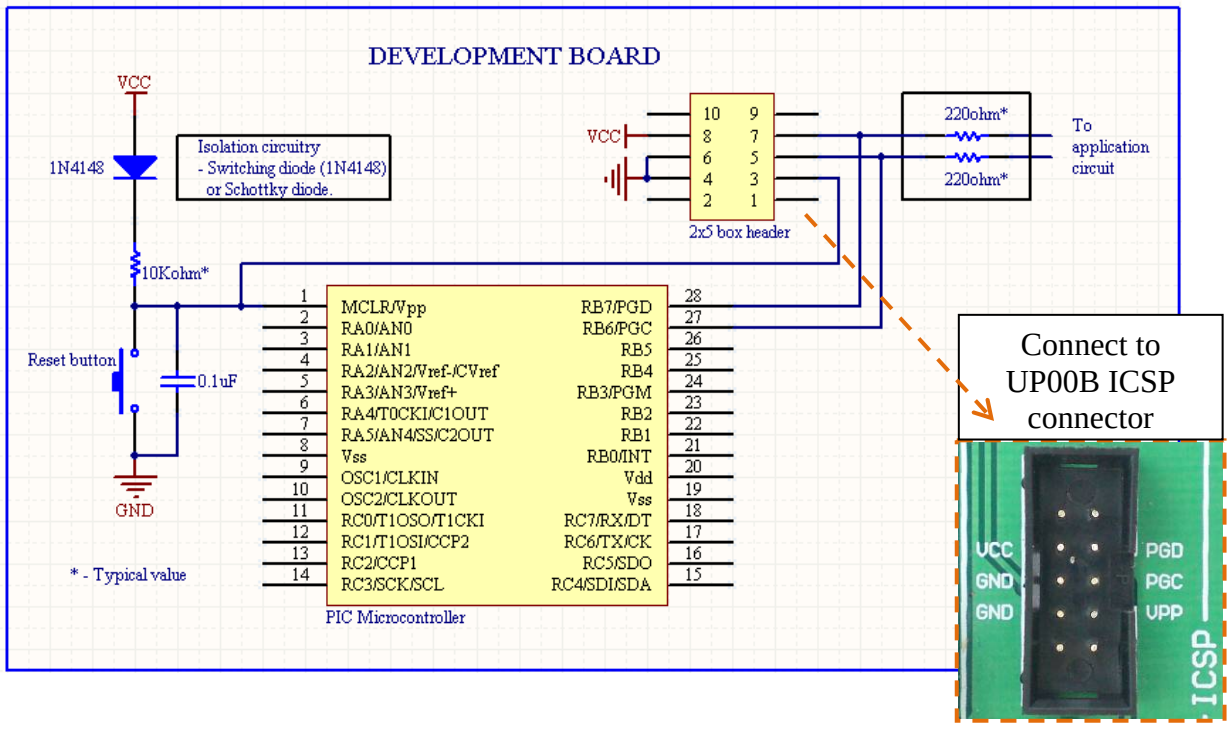
6.2 Connecting UP00B to circuit board via ICSP connector

By using In-Circuit Serial Programming (ICSP), UP00B can program PIC microcontroller mounted on the application circuit without taking out the PIC from the circuit. In-Circuit Serial Programming requires five signals:

- V_{PP} – Programming voltage input. When applied, the device goes into programming mode.
- ICSPCLK/PGC – Programming clock; a unidirectional synchronous serial clock line from the programmer to the target.
- ICSPDAT/PGD – Programming data; a bidirectional synchronous serial data line.
- V_{DD} (5V) – Power supply positive voltage, it can be either from programmer or application circuit. This is optional to target PIC. If target PIC is powered externally (recommended) this pin should **NOT** be connected to target PIC.
- V_{SS} (GND) – Power supply ground reference.

To load program using ICSP, the application circuit must be designed to allow all programming signals (V_{PP}, ICSPCLK/PGC and ICSPDAT/PGD) to connect to the PIC microcontroller device without distorting the programming signals.

Figure below shows a typical circuit as a starting point when designing an application circuit for the ICSP using the 2x5 box header on target board. Those unconnected pins (1, 2, 9 & 10) of the box header should **be left unconnected** on application circuit. Instead of using the 2x5 box header connector on UP00B, user may also use the 1x5 header pin connector for ICSP.



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Note: **ONLY** connect to **ONE CONNECTOR** at the same time. **DO NOT** tries to use both connectors to program two PICs simultaneously.

Note: PIC microcontroller in the figure above is for reference purpose only. Hence the actual pin diagram may differ for different PIC model. Refer to chapter 3 for supported PIC models.

Please beware of:

- During programming mode, V_{PP} voltage will be raised to about 13.25V. It is recommended to isolate the supervisory circuit if interfaces with MCLR pin by using Schottky-type diode or high switching diode (1N4148) to prevent V_{PP} voltage slew rate from slow down and exceeds the rise time in the programming specification (typically 1µs). There should **not** be capacitive component (capacitor) connected to MCLR **directly**.

- RB7/PGD or RB6/PGC pin are recommended to use as output controlling non critical device such as LED, LCD, 7 segments or buzzer. It is recommended to isolated ICSP signals from application circuit by using series resistor (range 220 ohm and above) as shown in the above figure. Furthermore, **NO** capacitive component (capacitor) should be connected to these 2 pins directly.

- During ICSP programming, PIC microcontroller needs to be powered. It is recommended to power the target externally. USB is not able to support large power usage. If target PIC is powered externally, V_{DD} (5V) should **NOT** be connected to target PIC.

- The **minimum connections** from UP00B to target board or PIC are **four**. These include **V_{PP}**, **PGD**, **PGC** and **V_{SS} (Gnd).**

- Thus, the 5V from UP00B is an **optional connection**. If user is powering up the target board with external power, this pin is not necessary to connect from UP00B to the target board.

Note: Please refer to the In-Circuit Serial Programming (ICSP) section in the datasheet of the PIC that you want to program for further information and special caution if any.

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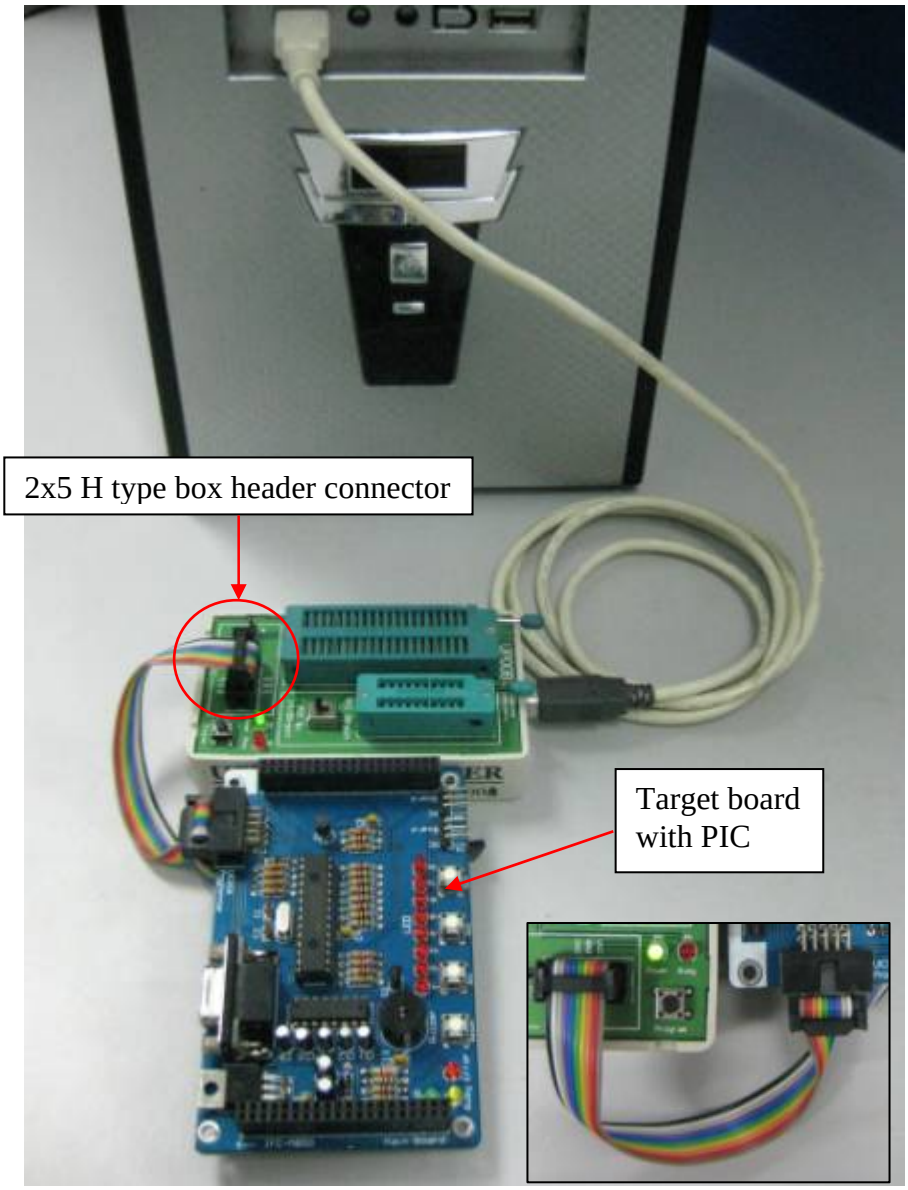
Following steps show the method to connect UP00B to PIC on a target board via ICSP connection if user cannot or do not want to place PIC in ZIF sockets for programming.

1. An example of ICSP connection using 2x5 H type box header connector.



Note: No cable is provided in UP00B package for the ICSP connection. User may build own cable by referring to the labels of ICSP on UP00B and the ICSP connection of the PIC used.

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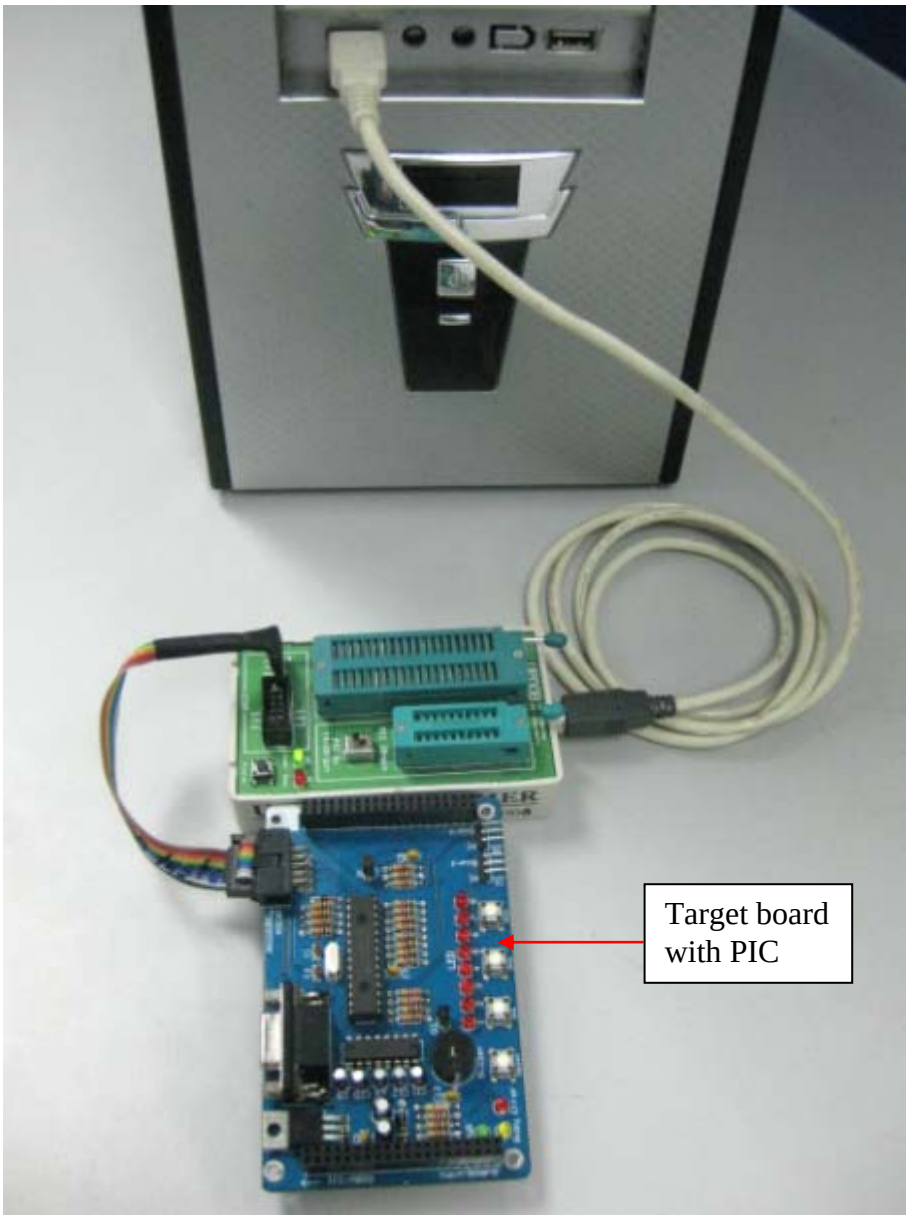
2. An example of ICSP connection using 1x5 pin header connector.



Picture shows an example of ICSP connection using 1x5 pin header to 2x5 H type box header connector. User may also use 1x5 pin header connector for the target board depends on the circuit design or the connector provided on the target board.

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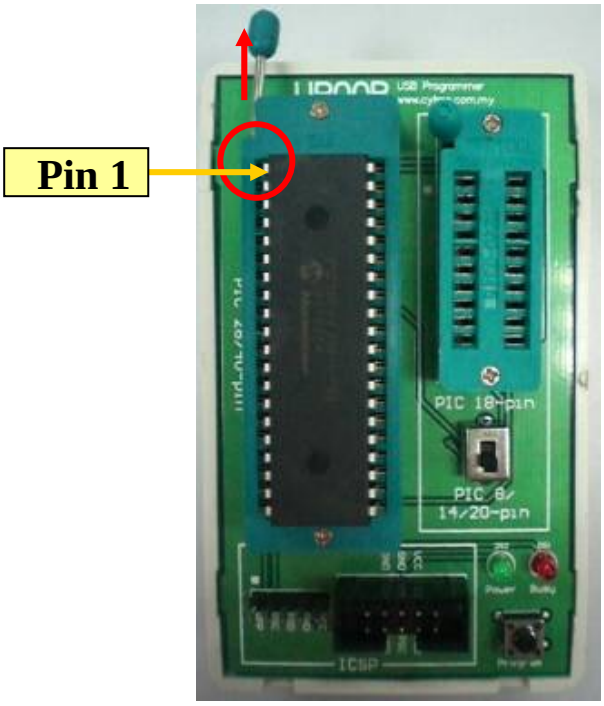
6.3 Plugging the PIC Microcontroller

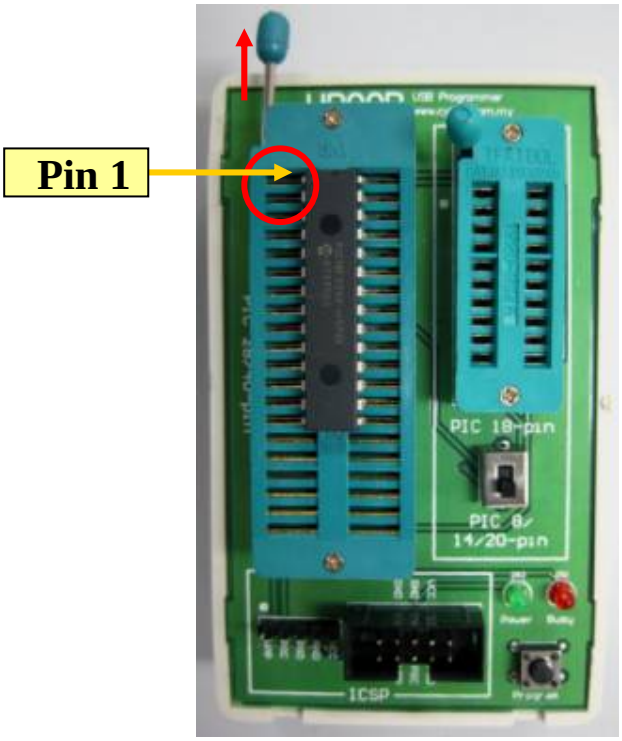
40-pin PIC Microcontroller

- Plug in the microcontroller at the ZIF Socket 40 pin (indicated on the board) and **push the toggle** as shown.



28-pin PIC Microcontroller

- Plug in the microcontroller at the upper portion of ZIF Socket 40 pin (indicated on the board) and **push the toggle** as shown.



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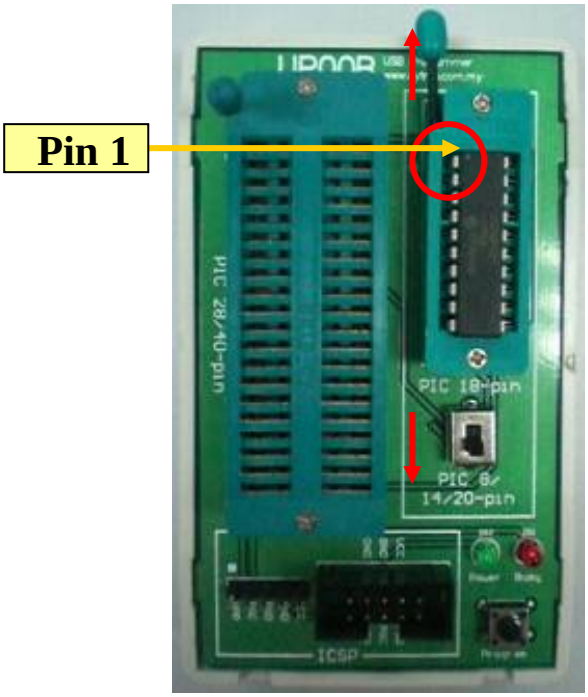
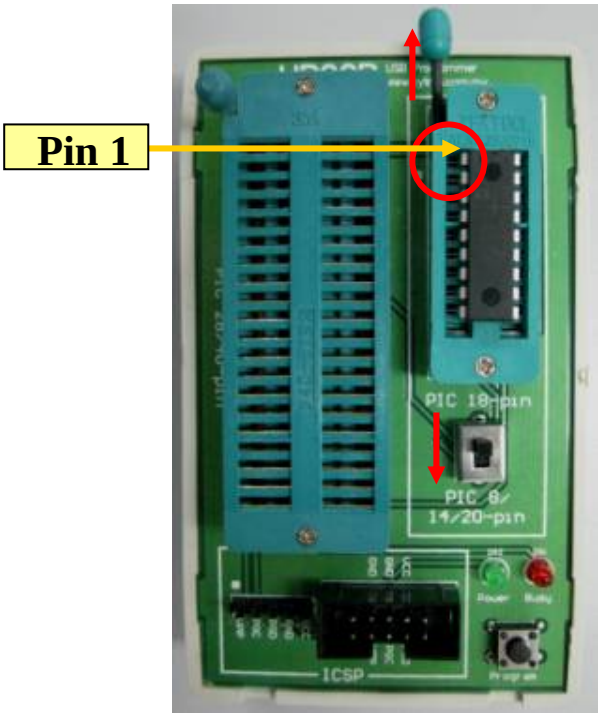
20-pin PIC Microcontroller

- Plug in the microcontroller at the ZIF Socket 20 pin (indicated on the board) and **push the selector to PIC 8/14/20-pin** then **push the toggle** as shown.



18-pin PIC Microcontroller

- Plug in the microcontroller at the ZIF Socket 20 pin (indicated on the board) and **push the selector to PIC 18-pin** then **push the toggle** as shown.



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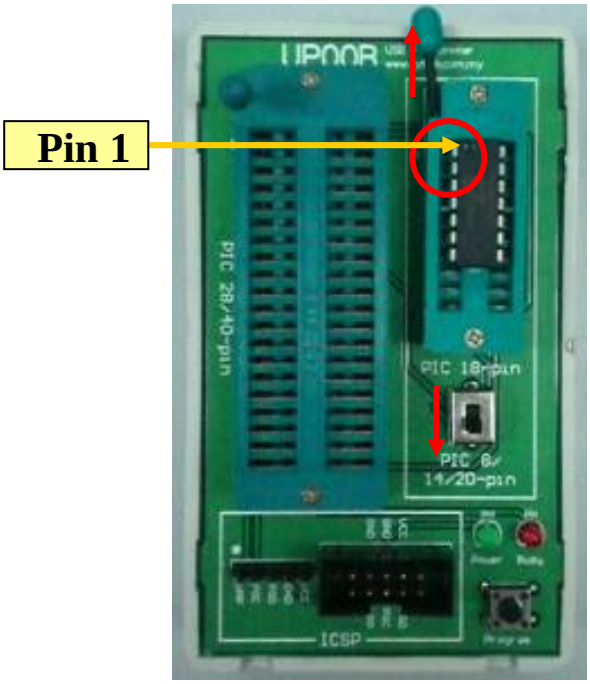
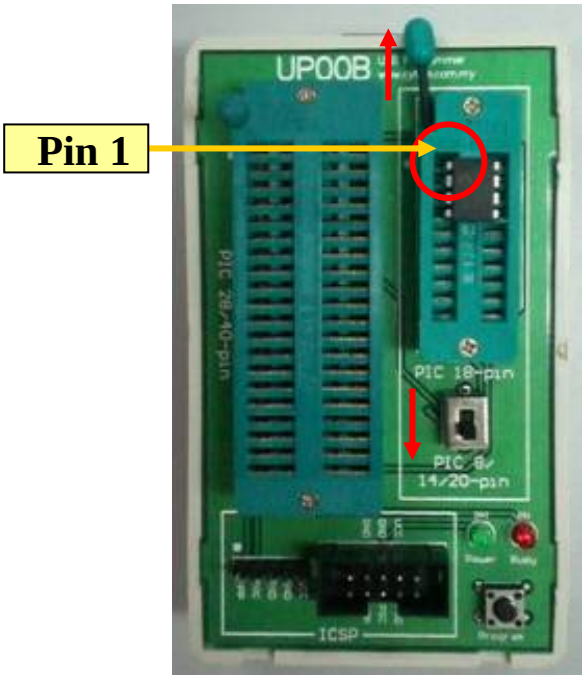
14-pin PIC Microcontroller

- Plug in the microcontroller at the ZIF Socket 20 pin (indicated on the board) and **push the selector to PIC 8/14/20-pin** then **push the toggle** as shown.



8-pin PIC Microcontroller

- Plug in the microcontroller at the ZIF Socket 20 pin (indicated on the board) and **push the selector to PIC 8/14/20-pin** then **push the toggle** as shown.



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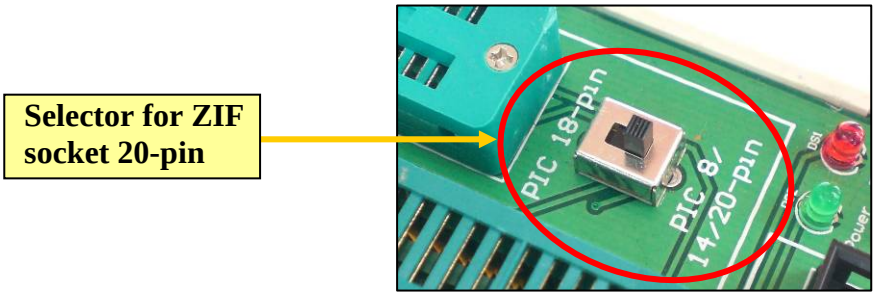
Note: Make sure the selector for ZIF socket 20-pin is switched to the correct direction each time before starts to program the 8-pin, 14-pin, 18-pin or 20-pin PIC.



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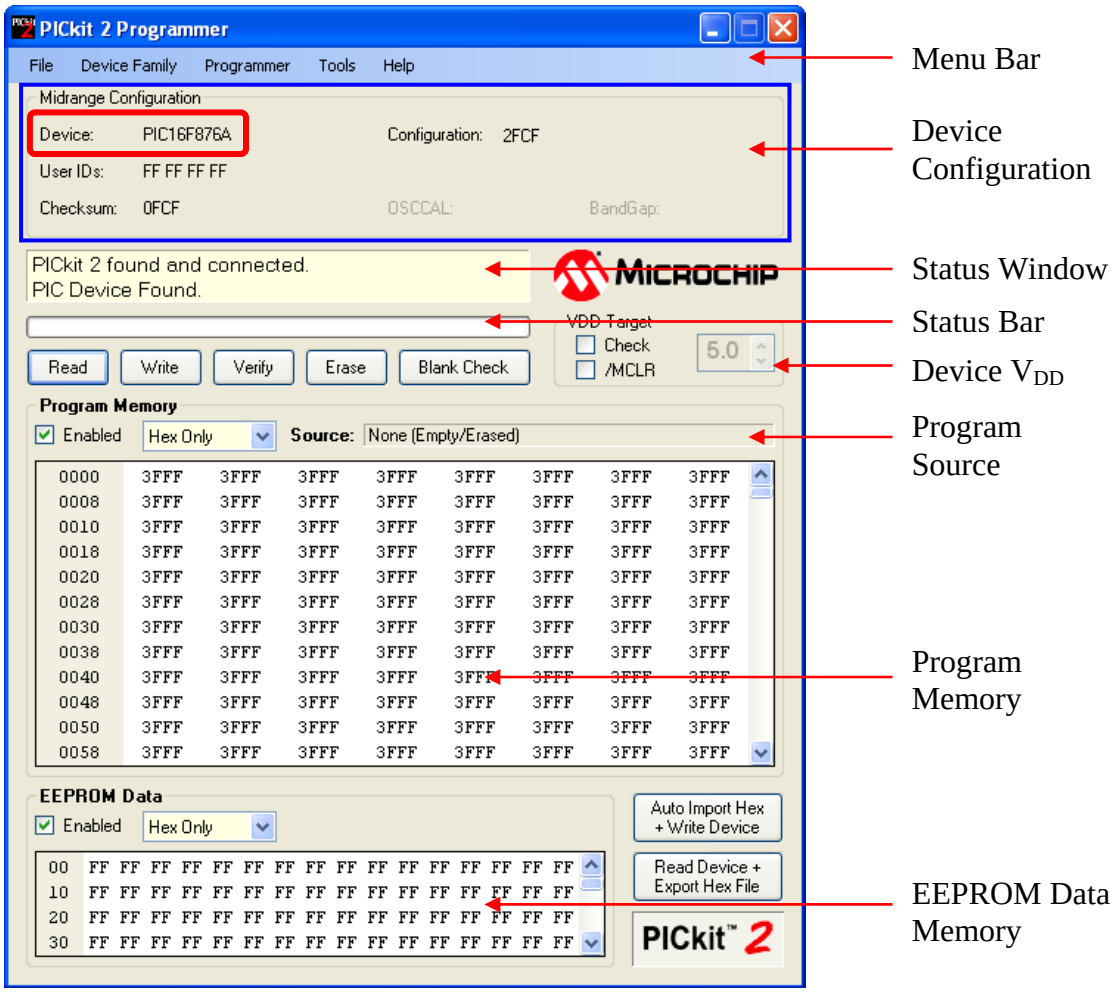
7. GETTING STARTED

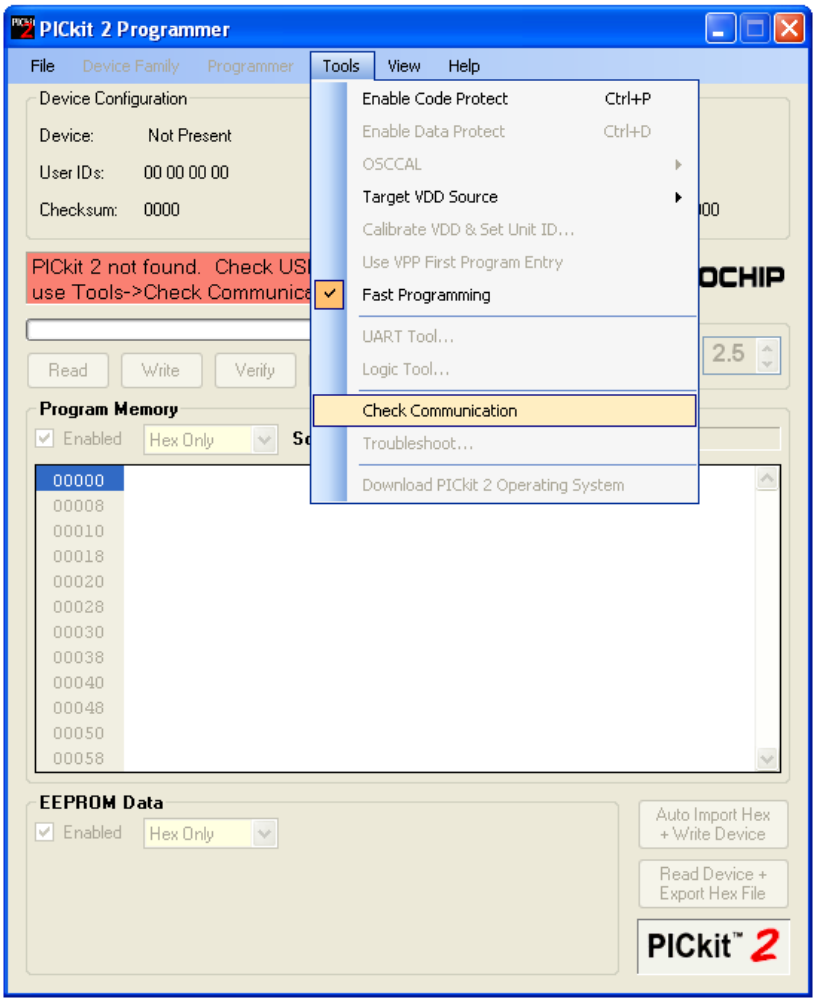
After hardware and software installation in previous section, UP00B is ready to be used with PICkit 2 programming software. This section gives instruction on how to get started with UP00B. With the help of pictures and some simple instruction, following section illustrates the steps to program PIC using 40-pin PIC, PIC16F877A.

a. Connect UP00B to computer. Once power is supplied, Power LED will turn ON.

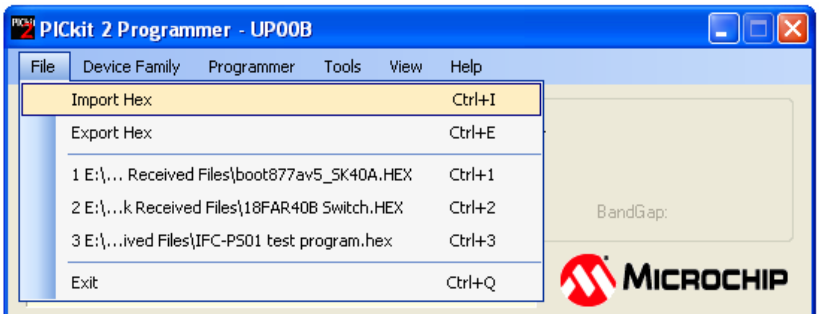
b. Launch PICkit 2 programming software by selecting *Start> Program> Microchip> PICkit 2*. (Buzy LED will turn ON for about 3 seconds) and plug in the PIC that needed to be programmed. Please refer to the steps to plug in microcontroller to ZIF sockets at section 5.2.3. Make sure the positions of PICs are correct. Cytron Technologies will not responsible for any chip damages. This programmer is able to automatically detect PIC from connected target and display it in the *Device Configuration* window.



c. If PICkit 2 Programmer does not detect the PIC automatically like picture above, user need to help PICkit 2 Programmer to detect it manually. Click Tools and then Check Communication. PICkit 2 Programmer will detect the device and name it.



d. Import the Hex code file that user wanted to load. Click File and Import Hex or press Ctrl+I



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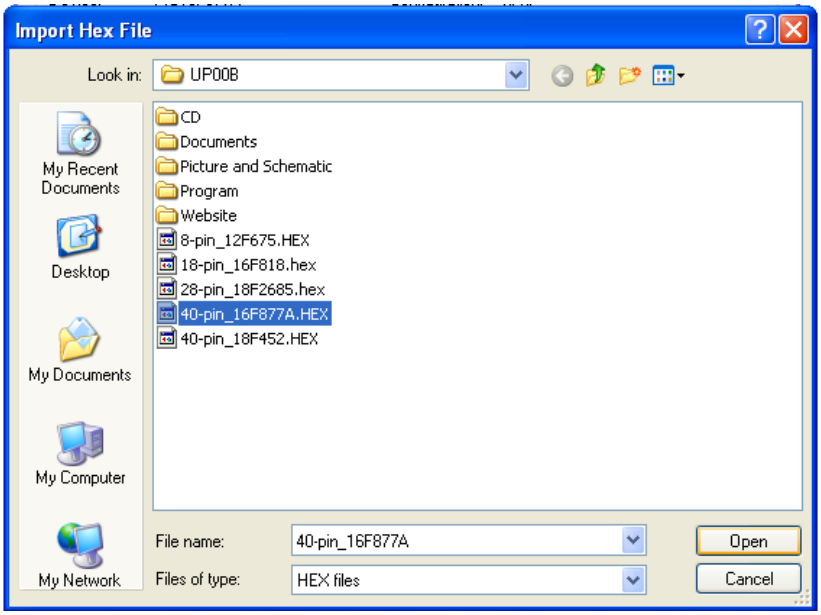
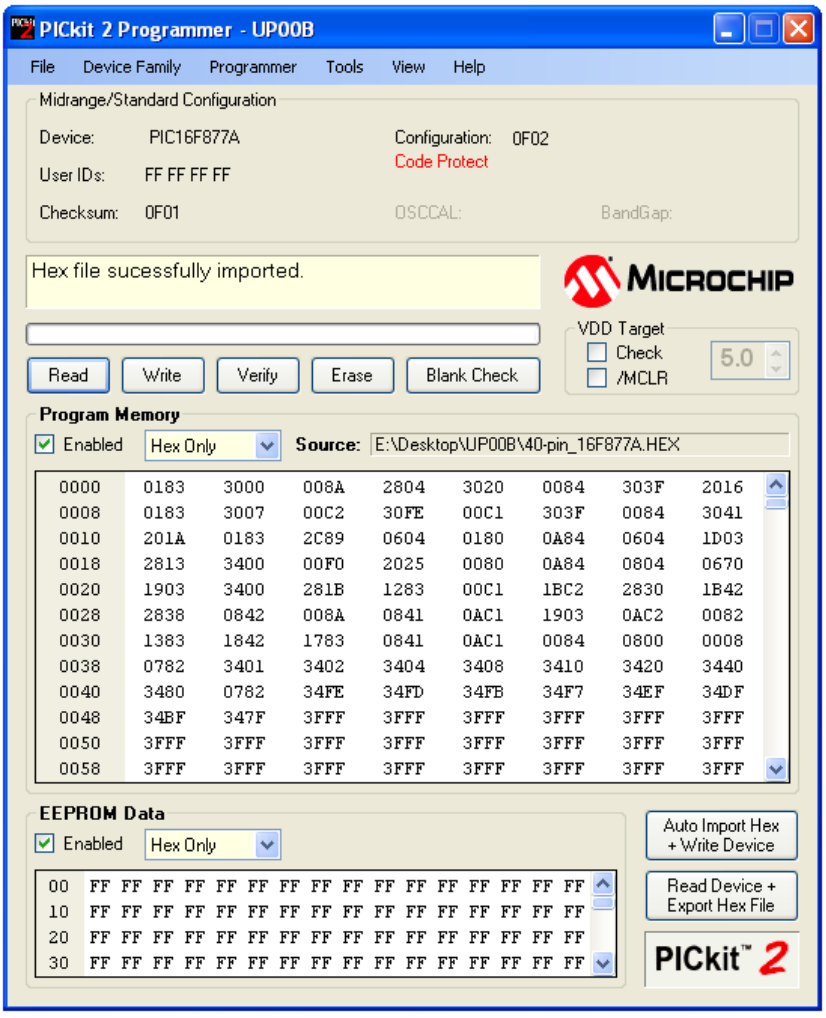
e. Search the file and click open.



f. If the Hex code is supported and match with the device, PICkit 2 Programmer will successfully import the Hex code.


PICkit 2 Programmer - UP00B
File
Device Family
Programmer
Tools
View
Help
Midrange/Standard Configuration
Device: PIC16F877A
Configuration: 0F02
Code Protect
User IDs: FF FF FF FF
Checksum: 0F01
OSCCAL:
BandGap:
Hex file sucessfully imported.
MICROCHIP
VDD Target
Check
/MCLR
5.0
Read
Write
Verify
Erase
Blank Check
Program Memory
Enabled
Hex Only
Source: E:\Desktop\UP00B\40-pin_16F877A.HEX
0000 0183 3000 008A 2804 3020 0084 303F 2016
0008 0183 3007 00C2 30FE 00C1 303F 0084 3041
0010 201A 0183 2C89 0604 0180 0A84 0604 1D03
0018 2813 3400 00F0 2025 0080 0A84 0804 0670
0020 1903 3400 281B 1283 00C1 1BC2 2830 1B42
0028 2838 0842 008A 0841 0AC1 1903 0AC2 0082
0030 1383 1842 1783 0841 0AC1 0084 0800 0008
0038 0782 3401 3402 3404 3408 3410 3420 3440
0040 3480 0782 34FE 34FD 34FB 34F7 34EF 34DF
0048 34BF 347F 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
0050 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
0058 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
EEPROM Data
Enabled
Hex Only
00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
10 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
20 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
30 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
Auto Import Hex + Write Device
Read Device + Export Hex File
PICkit 2

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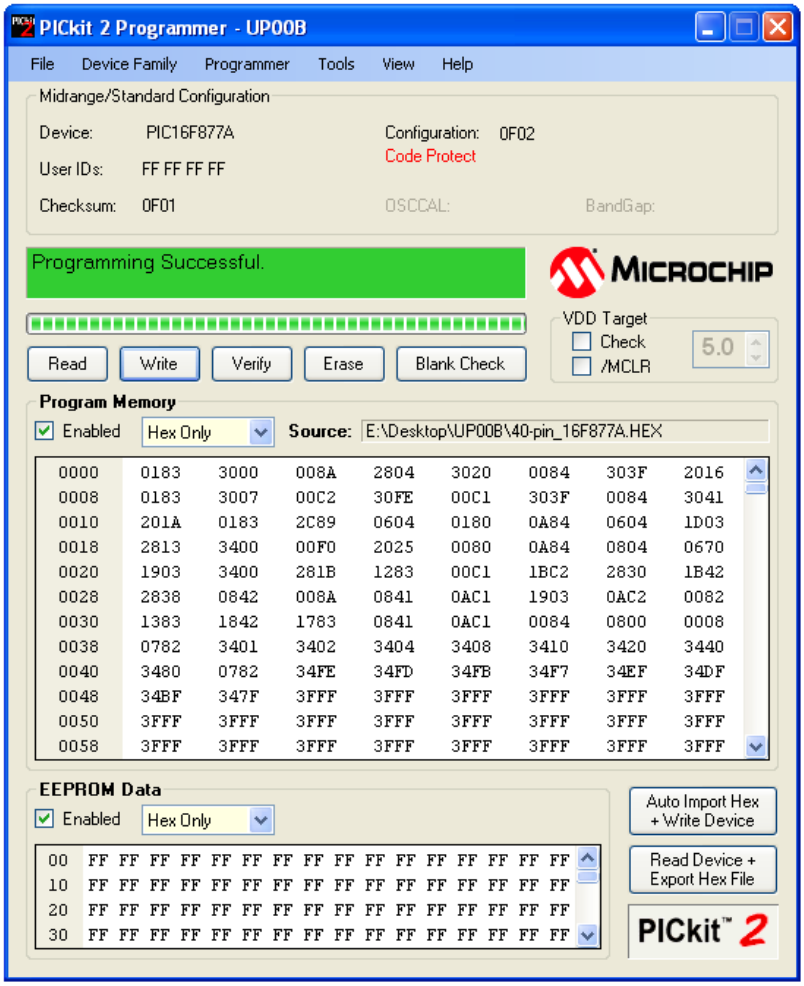
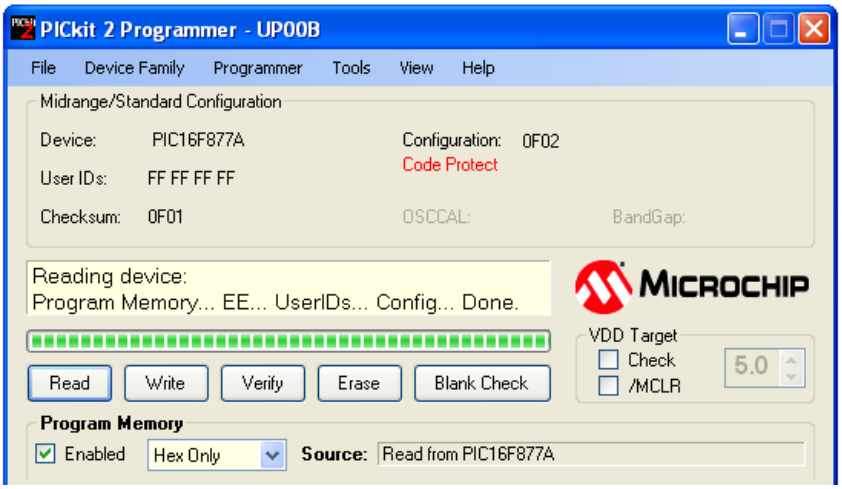
g. If Hex file has been successfully imported, the target device can be programmed by clicking on *Write*. The PIC will be erased and programmed with the new Hex code imported. The operation status will display on the *Status Bar* and the status bar will turn to GREEN if the writing is successful.


PICkit 2 Programmer - UP00B
File Device Family Programmer Tools View Help
Midrange/Standard Configuration
Device: PIC16F877A
Configuration: 0F02
Code Protect
User IDs: FF FF FF FF
Checksum: 0F01
OSCCAL:
BandGap:
Programming Successful.
MICROCHIP
VDD Target
Check
/MCLR
5.0
Read Write Verify Erase Blank Check
Program Memory
Enabled Hex Only Source: E:\Desktop\UP00B\40-pin_16F877A.HEX
0000 0183 3000 008A 2804 3020 0084 303F 2016
0008 0183 3007 00C2 30FE 00C1 303F 0084 3041
0010 201A 0183 2C89 0604 0180 0A84 0604 1D03
0018 2813 3400 00F0 2025 0080 0A84 0804 0670
0020 1903 3400 281B 1283 00C1 1BC2 2830 1B42
0028 2838 0842 008A 0841 0AC1 1903 0AC2 0082
0030 1383 1842 1783 0841 0AC1 0084 0800 0008
0038 0782 3401 3402 3404 3408 3410 3420 3440
0040 3480 0782 34FE 34FD 34FB 34F7 34EF 34DF
0048 34BF 347F 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
0050 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
0058 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF 3FFF
EEPROM Data
Enabled Hex Only
00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
10 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
20 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
30 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
Auto Import Hex + Write Device
Read Device + Export Hex File
PICkit 2

h. *Read* function is to view the code written in the PIC. The code will be display in the Program Memory and Data EEPROM Memory. Any data read from the device will show in Program Data and EEPROM Data columns. If all *FFFF* displayed, it is possible that the target device is blank or it is code-protected.



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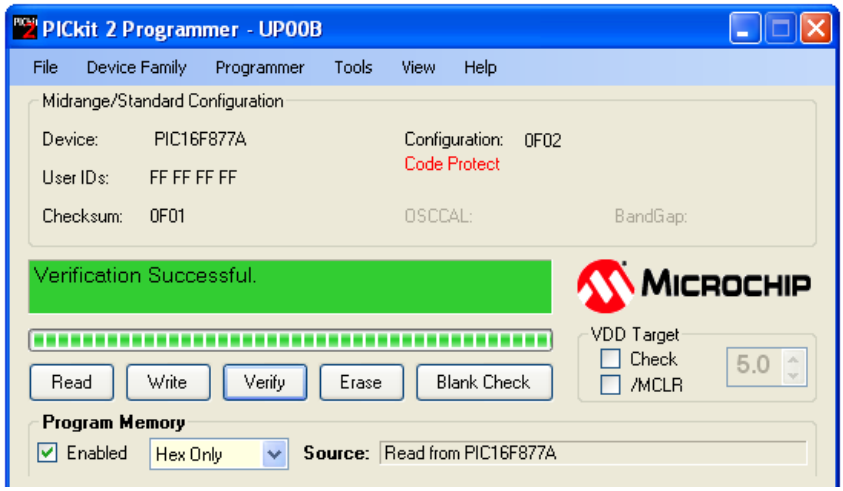
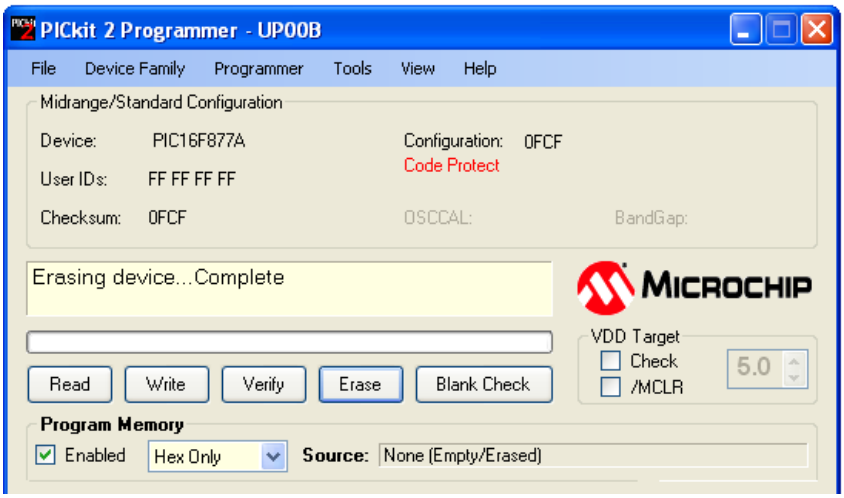
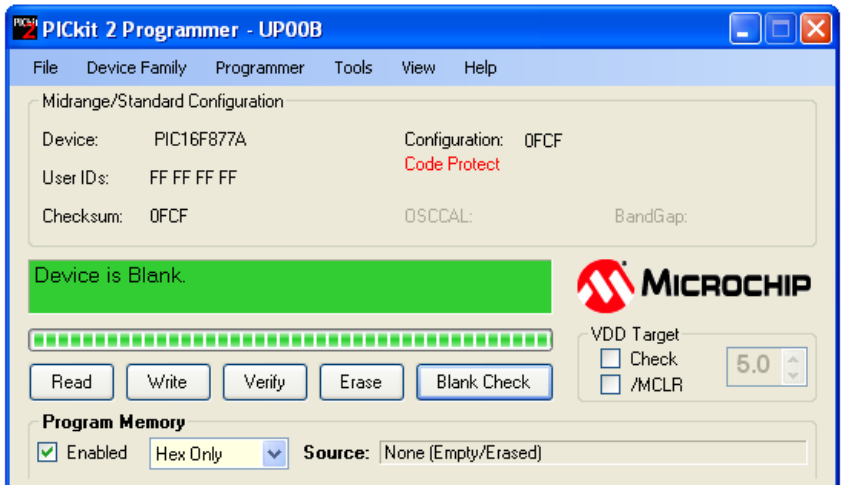
i. Same method is applied if user wants to Read, Write, Verify, Erase or Blank Check the programming in PIC. *Verify* function verify the device program to the imported Hex file. If user wants to verify the programming, click Verify.



j. If user wants to erase the programming, click Erase.



k. Click Blank Check.



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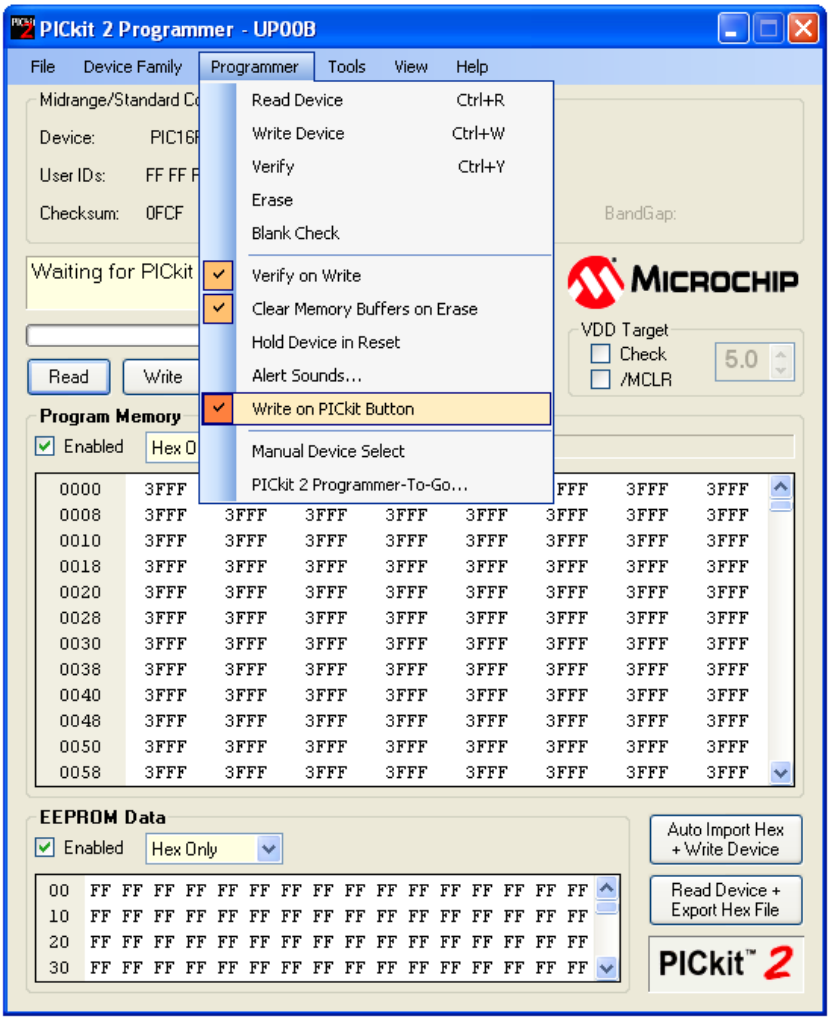
l. Push button (on UP00B main board) is a special feature to load Hex file into the target device. Push button can be used after *Programmer>Write on PICkit Button* is checked as figure below:



m. After "Write on PICkit Button" is checked, browse for the Hex file location and open to start imported the Hex file same as steps (d) to (f).

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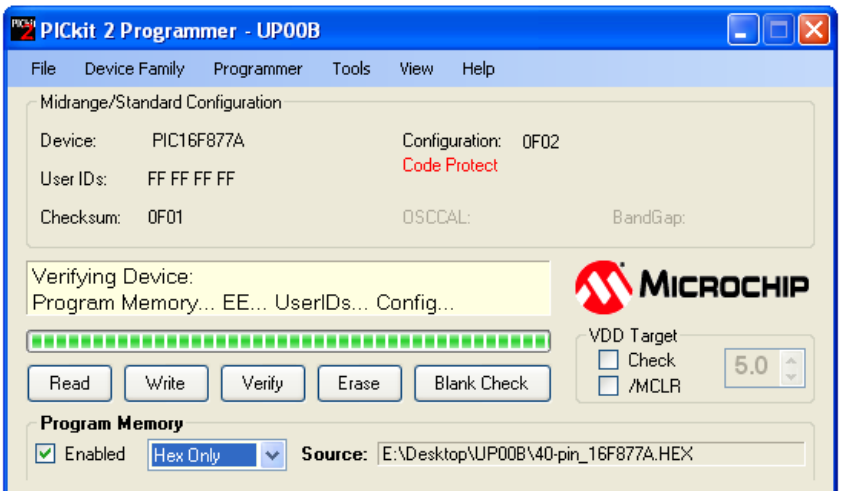
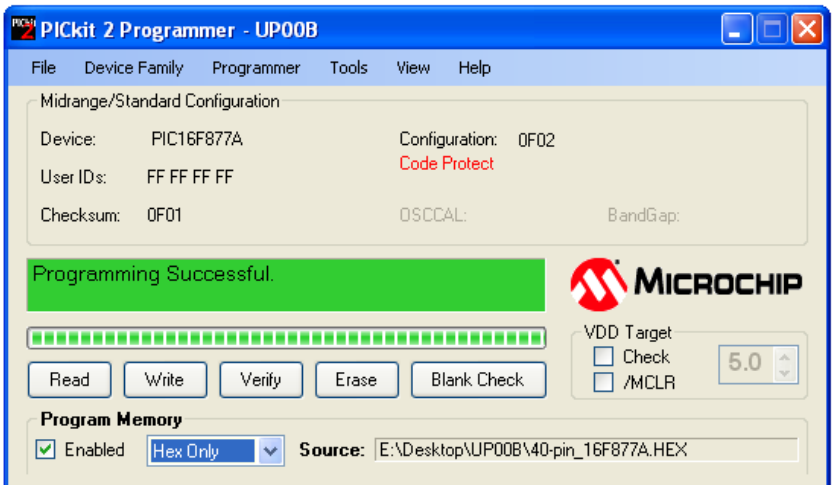
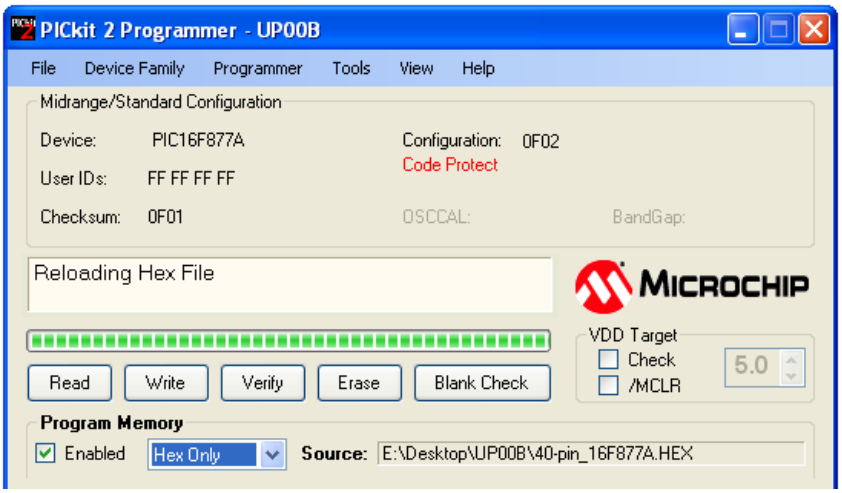
n. Press push button and the Hex file will automatically program into the target device.



o. After write and verify the devices finished, programming is successful.



p. Push button allow user to reload the updated hex file into the target device. After convert any changes in the program into Hex file, press push button again and UP00B will automatically reload the new Hex file, further program into the target device.



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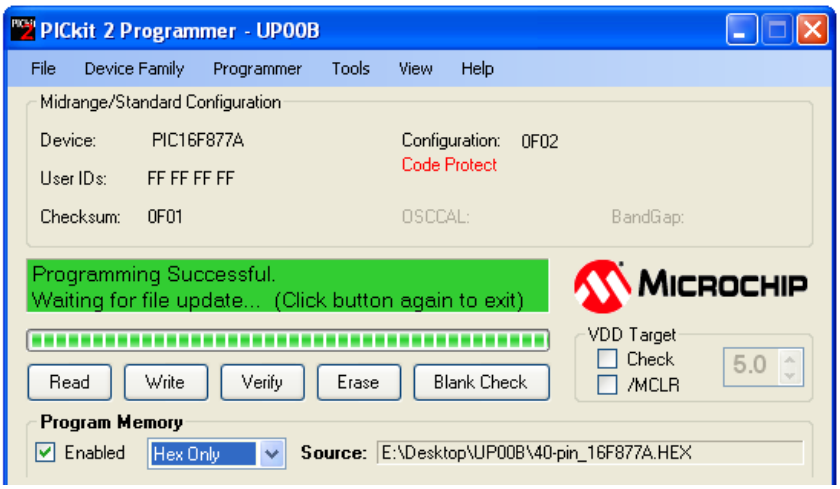
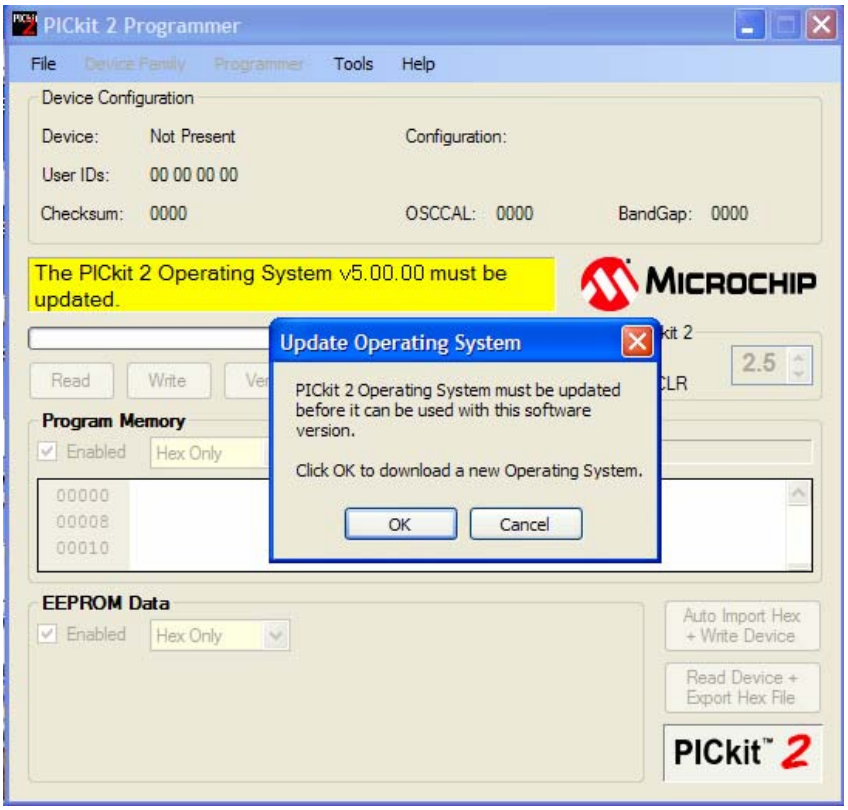
q. *Auto Import Hex + Write Device* allows the programmer to automatically import and write the Hex file to the connected device when the Hex file is updated, for an example on a new firmware build. By clicking this icon, it will bring up an Import Hex File dialog.

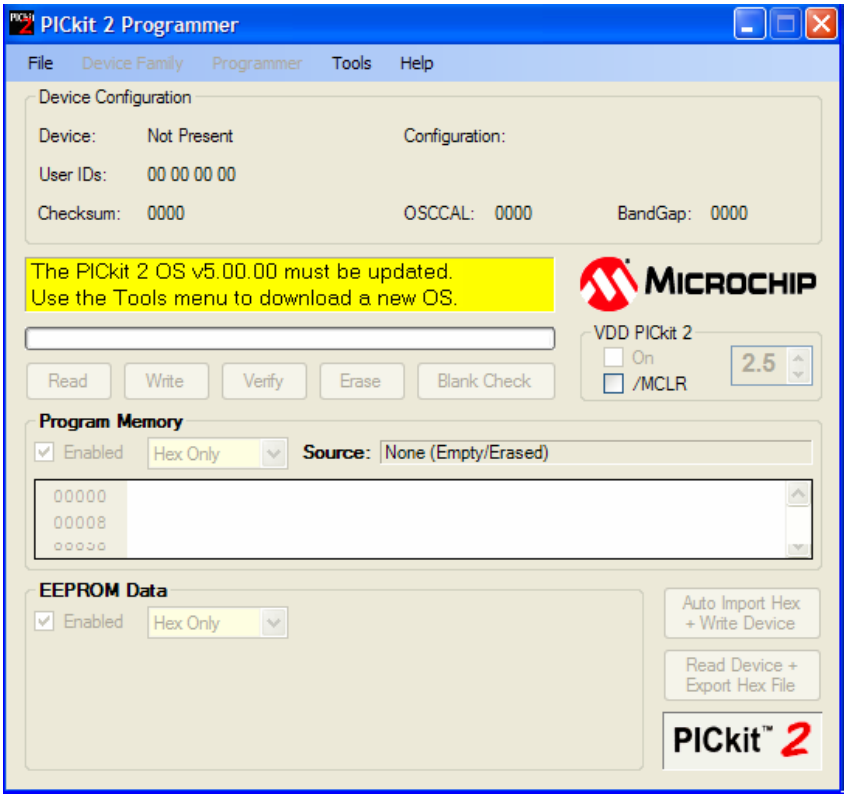
r. After selecting file, Hex code will be written to the target device and UP00B will monitor the selected file for update. If the file is updated (after compiled), UP00B will automatically re-imports the Hex file and writes to the target device. To disable this feature, simply click this icon again.



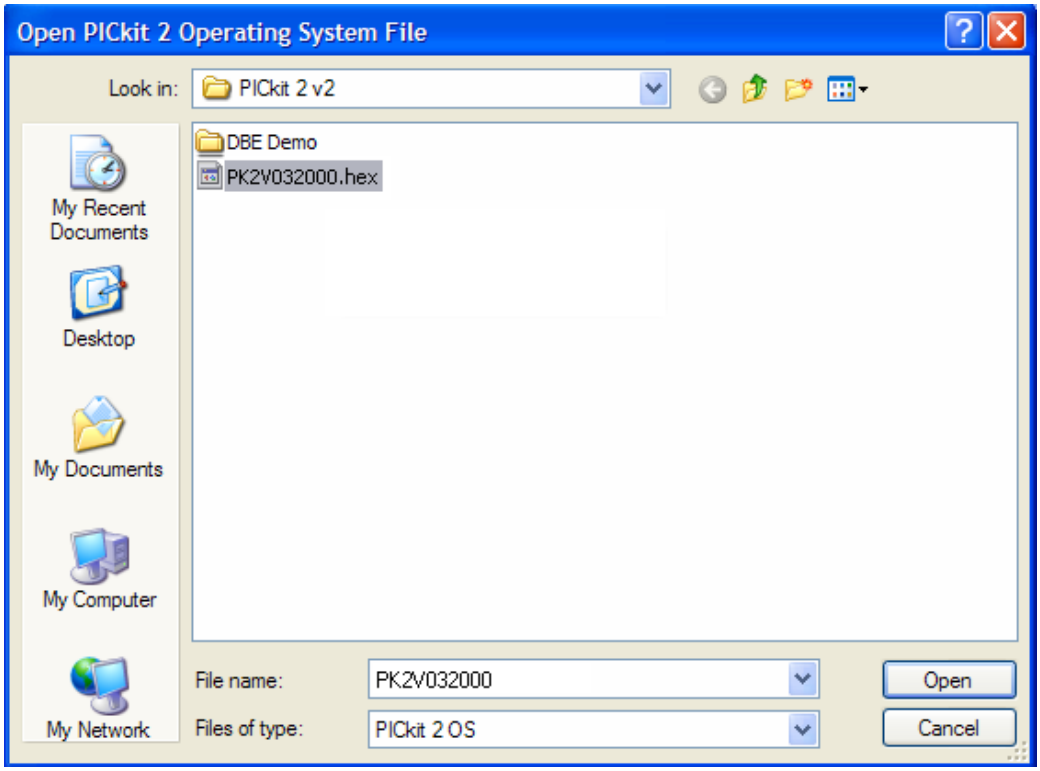
s. For some Window, user might need to update PICkit 2 Operating System as shown in following two figures.



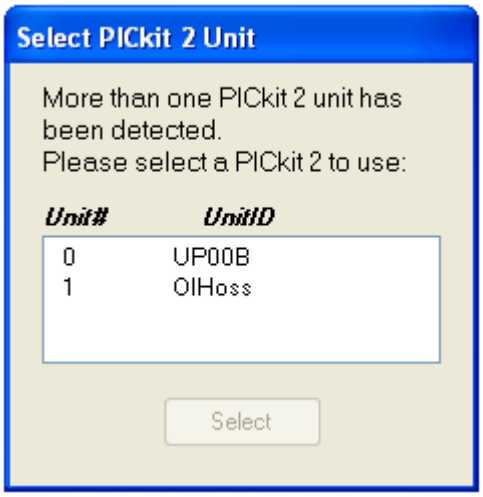
t. Please click OK for first figure, or go to *Tools> Download PICkit 2 Operating System* for second figure.



u. A browse window might appear as shown at following figure. Select the file shown and click Open to proceed. It will automatically update the Operating System. The file should be located in the same folder of PICkit 2 programming software.



v. If user connects two programmers at the same time, this box will appear. User need to select one programmer only.



Note: PC may restart or cannot detect UP00B if user do not use latest version of PICkit2 Programmer software and connect two programmers to a PC at the same time. For instance, connect a UP00B to a PC which already has UIC00A (Cytron's USB ICSP PIC Programmer) connected.

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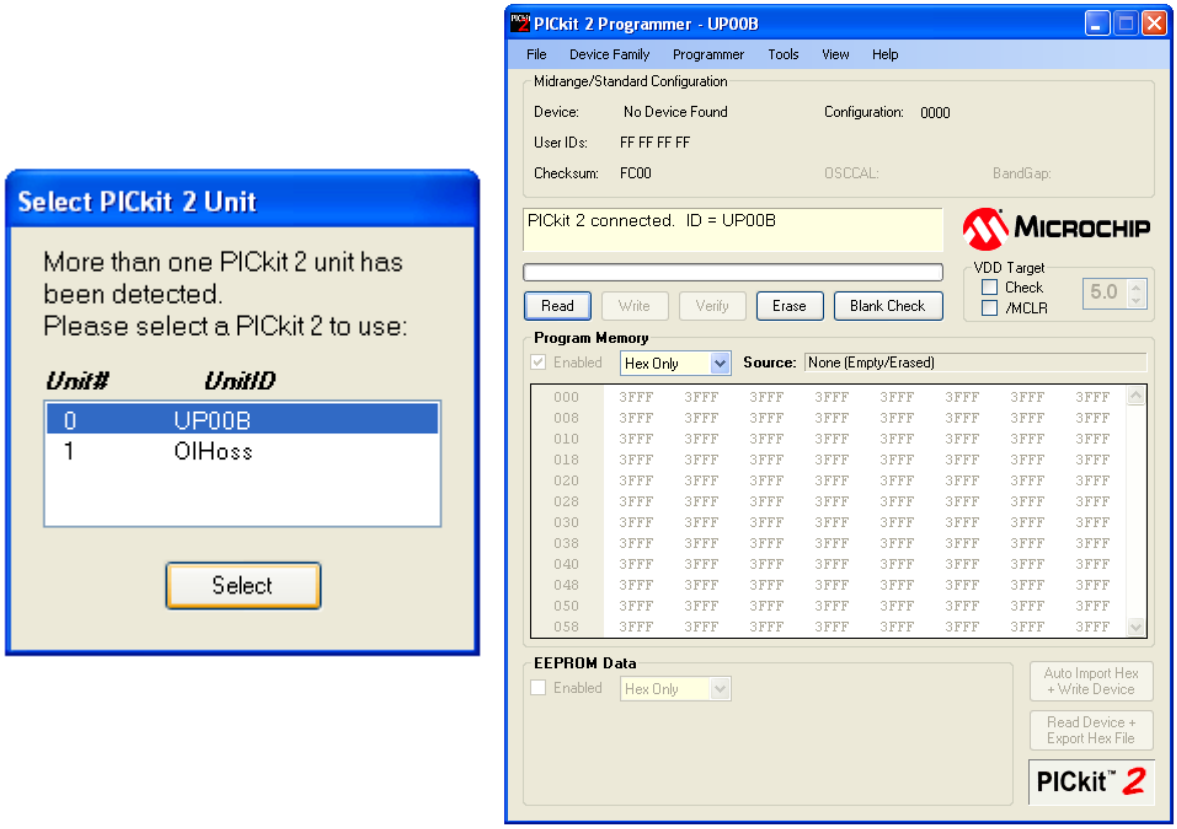
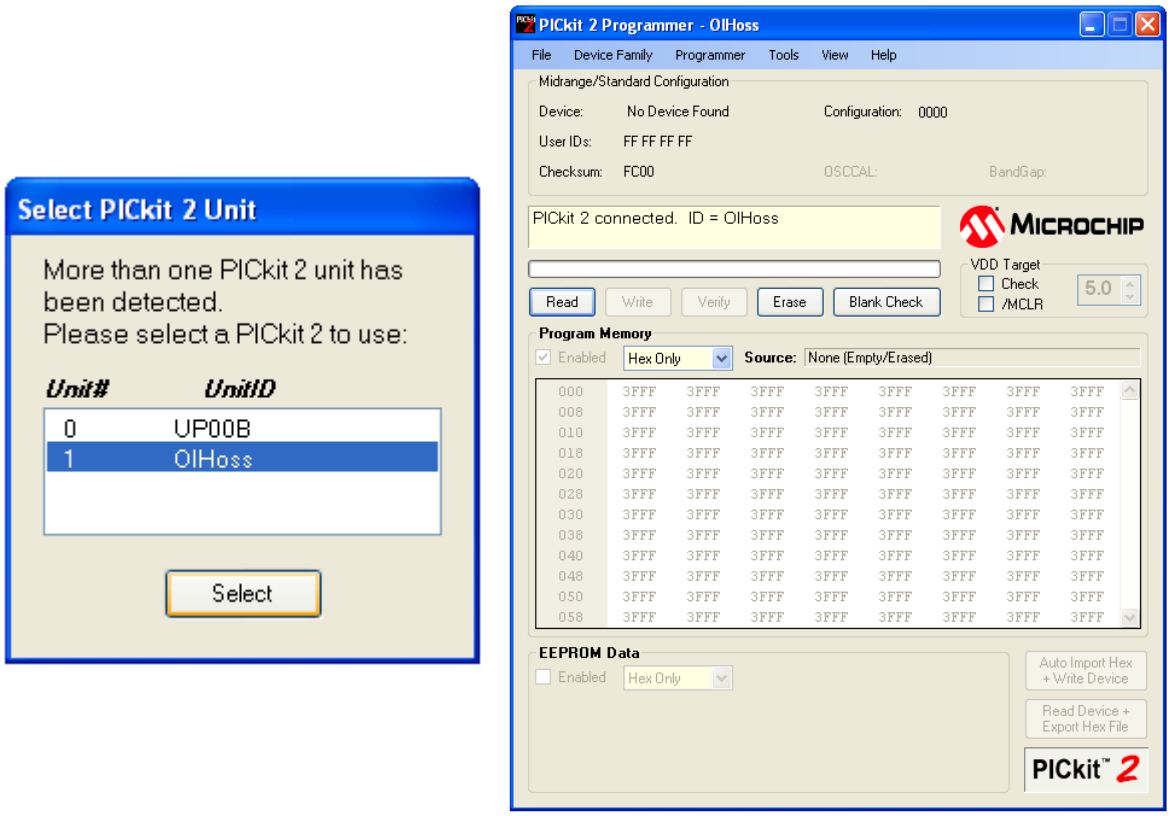
w. If user selects UP00B then PICkit2 will connect to UP00B.



x. If user selects the other unit, PICkit2 will connect to that programmer.



7. WARRANTY

- Product warranty is valid for 6 months.
- Warranty only applies to manufacturing defect.
- Damage caused by mis-use is not covered under warranty.
- Warranty does not cover freight cost for both ways.

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